

LISTING OF THE CLAIMS

1. (Original) A method for manufacturing a magnetic recording medium, comprising the steps of:

laminating a non-magnetic under-layer on a non-magnetic substrate by sputtering in an atmosphere having a partial pressure of H₂O of 2 x 10⁻¹⁰ Torr or below;

laminating a non-magnetic intermediate layer on said non-magnetic under-layer by sputtering in an atmosphere having a partial pressure of H₂O of 2 x 10⁻¹⁰ Torr or below;

laminating a magnetic layer on said intermediate layer by sputtering in an atmosphere having a partial pressure of H₂O of 2 x 10⁻¹⁰ Torr or below;

the step of lamination a magnetic layer including laminating to form at least ferromagnetic grains and grain boundaries surrounding said grains;

laminating a protective layer on said magnetic layer, and

laminating a liquid lubricant layer on said protective layer.

2. (Original) A method, according to claim 1, wherein:

said non-magnetic intermediate layer is made of at least a metal selected from the group consisting of Ti, Cr, Zr, Hf, Ti alloy, Cr alloy, Zr alloy and Hf alloy; and

said non-magnetic intermediate layer has a hexagonal close-packed crystal structure.

3. (Original) A method, according to claim 1, wherein:

said non-magnetic intermediate layer has a thickness of from 0.5 nm to 20 nm.

4. (Original) A method, according to claim 1, wherein:

 said non-magnetic grain boundary is composed of at least one of an oxide and a nitride of at least one element selected from the group consisting of Mg, Al, Si, Ti, Cr, Mn, Co, Zr, Ta, W and Hf.

5. (Original) A method, according to claim 1, wherein:

 said under-layer is composed of at least one of chromium and a chromium alloy.

6. (Original) A method, according to claim 1, wherein:

 said non-magnetic substrate is composed of a material selected from the group consisting of a crystallized glass, a chemically strengthened glass and a plastic.

7. (Original) A method, according to claim 1, wherein:

 said steps of laminating said non-magnetic under-layer, laminating said non-magnetic intermediate layer, laminating said magnetic layer, said step of laminating said protective layer, and said step of laminating said liquid lubricant layer include omitting heating during the performance of these steps.

8. (Cancelled).

9. (Original) A method for manufacturing a magnetic recording medium, comprising the steps of:

laminating a non-magnetic under-layer on a non-magnetic substrate by sputtering in an atmosphere having a partial pressure of H₂O of 2 x 10⁻¹⁰ Torr or below;

laminating a non-magnetic intermediate layer on said non-magnetic under-layer by sputtering in an atmosphere having a partial pressure of H₂O of 2 x 10⁻¹⁰ Torr or below, said non-magnetic intermediate layer made of at least a metal selected from the group consisting of Ti, Cr, Zr, Hf, Ti alloy, Cr alloy, Zr alloy and Hf alloy; said non-magnetic intermediate layer having a hexagonal close-packed crystal structure, and said non-magnetic intermediate layer having a thickness of from 0.5 nm to 20 nm;

laminating a magnetic layer on said intermediate layer by sputtering in an atmosphere having a partial pressure of H₂O of 2 x 10⁻¹⁰ Torr or below, said magnetic layer comprising at least ferromagnetic grains and grain boundaries surrounding said grains,

laminating a protective layer on said magnetic layer, and

laminating a liquid lubricant layer on said protective layer.

10. (Cancelled).

11. (Currently Amended) A method, according to claim 1 for manufacturing a magnetic recording medium, further comprising the steps of:

selecting a non-magnetic substrate;

~~laminating a non-magnetic under layer on a non-magnetic substrate by sputtering in an atmosphere having a partial pressure of H₂O of 2 x 10⁻¹⁰ Torr or below;~~

~~laminating a non-magnetic intermediate layer on said non-magnetic under layer by sputtering in an atmosphere having a partial pressure of H₂O of 2 x 10⁻¹⁰ Torr or below, wherein~~
said non-magnetic intermediate layer made of at least a metal selected from the group consisting of Ti, Cr, Zr, Hf, Ti alloy, Cr alloy, Zr alloy and Hf alloy; said non-magnetic intermediate layer having a hexagonal close-packed crystal structure, and said non-magnetic intermediate layer having a thickness of from 0.5 nm to 20 nm;

~~laminating a magnetic layer on said intermediate layer by sputtering in an atmosphere having a partial pressure of H₂O of 2 x 10⁻¹⁰ Torr or below, said magnetic layer comprising at least ferromagnetic grains and grain boundaries surrounding said grains,~~

~~laminating a protective layer on said magnetic layer;~~

~~laminating a liquid lubricant layer on said protective layer; and~~

~~conducting said steps of laminating without a step of heating.~~

12. (Cancelled.)

13. (Original) A method for manufacturing a magnetic recording medium, comprising the steps of:

selecting a non-magnetic substrate;

laminating a non-magnetic under-layer on a non-magnetic substrate by sputtering in an atmosphere having a partial pressure of H₂O of 2 x 10⁻¹⁰ Torr or below;

laminating a non-magnetic intermediate layer on said non-magnetic under-layer by sputtering in an atmosphere having a partial pressure of H₂O of 2 x 10⁻¹⁰ Torr or below, said non-magnetic intermediate layer made of at least a metal selected from the group consisting of Ti, Cr, Zr, Hf, Ti alloy, Cr alloy, Zr alloy and Hf alloy; said non-magnetic intermediate layer having a hexagonal close-packed crystal structure, and said non-magnetic intermediate layer having a thickness of from 0.5 nm to 20 nm;

laminating a magnetic layer on said intermediate layer by sputtering in an atmosphere having a partial pressure of H₂O of 2 x 10⁻¹⁰ Torr or below, said magnetic layer comprising at least ferromagnetic grains and non-magnetic grain boundaries surrounding said grains, said non-magnetic grain boundaries being composed of at least one of an oxide and a nitride of at least one element selected from the group consisting of Mg, Al, Si, Ti, Cr, Mn, Co, Zr, Ta, W and Hf;

laminating a protective layer on said magnetic layer, and

laminating a liquid lubricant layer on said protective layer.

14. (Cancelled).

15. (Currently Amended) A method, according to claim 1, wherein for manufacturing a magnetic recording medium, comprising the steps of:

— ~~laminating a non-magnetic under layer on a non-magnetic substrate by sputtering in an atmosphere having a partial pressure of H₂O of 2 x 10⁻¹⁰ Torr or below;~~

— ~~laminating a non-magnetic intermediate layer on said non-magnetic under layer by sputtering in an atmosphere having a partial pressure of H₂O of 2 x 10⁻¹⁰ Torr or below, said non-~~

magnetic intermediate layer being at least one of a metal selected from the group consisting of Ti, Cr, Zr, Hf, Ti alloy, Cr alloy, Zr alloy and Hf alloy;

 said non-magnetic intermediate layer having a hexagonal close-packed crystal structure;

 said non-magnetic intermediate layer having a thickness of from 0.5 nm to 20 nm;

~~laminating a magnetic layer on said intermediate layer by sputtering in an atmosphere~~

~~having a partial pressure of H₂O of 2 × 10⁻¹⁰ Torr or below, said magnetic layer including at least ferromagnetic grains and non-magnetic grain boundaries surrounding said grains, said non-magnetic grain boundaries being composed of at least one of an oxide and a nitride of at least one element selected from the group consisting of Mg, Al, Si, Ti, Cr, Mn, Co, Zr, Ta, W and Hf;~~

~~laminating a protective layer on said magnetic layer,~~

~~laminating a liquid lubricant layer on said protective layer; and~~

 omitting heating during said steps of laminating.

16. (Original) A magnetic recording medium manufactured by a method according to claim 15.

RESTRICTION REQUIREMENT

The Examiner has required restriction among the claims of, and defined the groups as:

Group I: Claims 1-7, 9, 11, 13 and 15, drawn to a method of manufacturing a magnetic recording head, classified in class 29, subclass 603.13; or

Group II: Claims 8, 10, 12, 14 and 16, drawing to a magnetic recording head, classified in class 360, subclass 126.

In response, Applicants provisionally elect to prosecute the invention of Group I, claims 1-7, 9, 11, 13 and 15 without traverse. However, Applicants respectfully disagree with the Examiner's description of the groups of the invention. Both Group I and Group II are a method and apparatus, respectively directed to a magnetic recording medium not a magnetic recording head. Applicants request clarification on this point.

Further, if Group I was elected, the Examiner has imposed a Species Restriction requiring the election of a single disclosed species for prosecution on the merits. Also, the Examiner has determined that no claims are generic. The species are:

Species A: Claims 1-7, 9, and 13 directed to a laminating process; and

Species B: Claims 11 & 15 directed to a laminating process without heating.

Applicants provisionally elect Species A, claims 1-7, 9 and 13 with traverse. Applicants have amended claims 11 and 15 to depend on claim 1 and have rendered the election of species moot, and request claims 1-7, 9, 11, and 15 are all examined together.

However, if the Examiner maintains the Election of a Species, Applicants traverse the finding that no claim is generic. Applicants submit that at least claim 1 is generic and the election is traversed in that if a generic claim is allowed, Applicants request rejoinder of claims 11 and 15.

CONCLUSION

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Dated: March 1, 2004

Respectfully submitted,

By 
Louis J. DelJudice

Registration No.: 47,522
DARBY & DARBY P.C.
P.O. Box 5257
New York, New York 10150-5257
(212) 527-7700
(212) 753-6237 (Fax)
Agent For Applicants